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ABSTRACT

This research focused on the initial stage of language development of a hearing child who was acquiring simultaneously both spoken English and American Sign Language (ASL). The report covers the first phase of the longitudinal research on the child's linguistic development, focusing on early word meanings. The data were collected from the time when the first sign emerged at 7 months, 6 days, to the age of 21 months. The child was videotaped at home during 30-minute play sessions at which both parents were present. The most important findings concern the relationship between the child's conceptual and linguistic systems. Three stages in semantic acquisition were traced in both ASL and English. It was demonstrated that expressing concepts and referring to "reality" can be accomplished with manual signifiers as easily as, or more readily than, with spoken words. It was concluded that, although the rate of lexical acquisition during early stages of language development might be delayed as a result of bilingual learning, more direct exposure to a visual language, such as ASL, might enhance communicative effectiveness at an early stage of a child's development. (AMH)

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ACQUISITION OF ASL AND SPOKEN ENGLISH IN A HEARING CHILD OF A DEAF MOTHER AND HEARING FATHER: PHASE I--EARLY LEXICAL DEVELOPMENT

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Studies of child language have traditionally been concerned primarily with two-word and longer utterances. However, several researchers have stressed the importance of one-word utterances on the basis of their own diary observations (Leopold's Hildegard, 1939-49; Bloom's Allison, 1973; Greenfield and Smith's Matthew and Nicky, 1976). As a result, researchers have begun to more systematically examine the role of semantics during early language acquisition and, in particular, the interaction of semantics and syntax at the holophrastic stage. The current research focuses on the initial stage of language development in a unique situation: the simultaneous acquisition of a spoken language (English) and a visual language (American Sign Language) in a hearing child, Anya, the first born of a profoundly deaf mother and a hearing father. Anya was consistently exposed to both ASL and spoken Standard American English since birth. During the first 12 months, both her mother and father spent equal time caring for the child. But, during the second year of life, Anya's mother assumed the role of primary caretaker. The rationale behind exposing Anya to ASL was simply to promote and facilitate communication between the deaf mother and child—emphasizing the native language, ASL, of the mother. There now exists substantial evidence that ASL constitutes a separate linguistic system (Wilbur, 1979).

Most previous studies on the acquisition of ASL have involved cases where the children were generally deaf and the parents either both deaf or both hearing. Earlier research in this area (Bellugi and Klima, 1972; McIntire, 1974; Wilbur and Jones, 1974; Schlesinger, 1978) indicate that children acquiring ASL pass through developmental stages similar to hearing children acquiring oral language. There is also some evidence to support the notion that in the absence of direct, systematic exposure to a standard manual linguistic model, deaf children spontaneously develop a gestural communication system incorporating similar stages used by a hearing child in learning a spoken language (Goldin-Meadow and Feldman, 1975). Additional evidence is available to demonstrate that a broad range of semantic relations found in children learning an oral language (Bloom, 1970), is also present in deaf children acquiring ASL. Children learning sign language also appear to acquire linguistic processing strategies at appropriate times in development (Wilbur, 1979).

The present study covers the first phase of the longitudinal research on Anya's linguistic development in ASL and spoken English—focusing on early word meanings or "developmental psycholexicography" —a term coined by Miller and Johnson-Laird in 1976. The following research questions were posed: What is the relationship between the child's spoken and sign vocabulary? Is a child who learns sign language

and spoken English "bilingual?" If so, does the fact that one language is oral and the other manual interfere with the ability to conceptualize or, secondly, learn two languages?

The data on Anya were collected from the time when the first sign emerged at 7 months, 6 days, to the age of 21 months, when she was systematically combining signs and words. The child was video-taped at home during monthly 30-minute play sessions. Both the mother and father were present during all observations. All signifiers (i.e., words, signs, or words plus signs), regardless of whether they were spoken by or addressed to Anya, were transcribed. All transcriptions were completed within 48 hours of the taping session. Additionally, all new signs and words used by the child spontaneously or in imitation of others were noted in a diary.

Initially, the emergence of the first sign versus the first word was compared. A number of researchers have shown that a deaf child's first sign may emerge 2 to 3 months prior to a hearing child's first spoken words (Boyes-Braem, 1973; McIntire, 1974; Wilbur and Jones, 1974). In the case of hearing children of deaf parents, the first sign may appear several months before the same child's spoken words (Sachs and Johnson, 1976). Anya's first sign MAMA was identified at age 7 months, 6 days. Interestingly, she reversed the hand configuration: the sign MAMA is produced with an open hand, fingers spread apart and thumb touching the chin. Anya produced the sign consistently with the little finger touching the chin. At a later stage in development (between 19 to 21 months), it was noted that she produced the same sign with even less precision and fine motor differentiation by touching the entire hand to the chin. This may parallel the early phonological sequences of development where hearing children accurately produce an entire range of phonemes (some of which may not even be represented in their own language) and later omit, substitute, and/or distort the same sounds. Some of Anya's early signs included MILK, FOOD, BIRD, HAT, and BOAT. All of these signs require increasing control over active-hand configuration, movement, and specification of orientation (Battison, 1974; McIntire, 1974).

McIntire (1974) reported four stages in the development of hand configuration in young deaf children which she claimed were influenced by such factors as 1) opposition of the thumb, 2) extension of one or more fingers, and 3) contact of a finger with the thumb. Although the specific stages of development of hand configuration were not as clearly delineated as those reported by McIntire, Anya's acquisition of ASL still demonstrates conformity to many of the phonological rules operative for all languages. Early in development, Anya employed "baby" signs similar to baby words which are frequently occurring in oral language acquisition. She exhibited a type of manual "babbling" behavior in that she would wave her hands around in apparent imitation of signs produced by her parents. Interestingly, Anya's imitative signs were generally more accurate and visually distinct than those which were spontaneously produced. The spontaneously produced signs were often

truncated in terms of hand configuration, the place within the sign space that a sign is made, and/or the parameter used to indicate motion. Some examples of early acquired but only partially differentiated signs included APPLE, which is produced by pressing the knuckle of the index finger of the right hand into the right cheek and twisting, which Anya produced by twisting the knuckles of her left hand into the left cheek. The sign FISH is produced by pointing the right open hand forward, palm facing left, and the left fingertips touching the right arm near the elbow and moving the right hand back and forth as in the movement of the fish's tail. Anya produced the sign with her extended left hand and wiggled her fingers instead of moving her hand back and forth. The sign SHOES is made by striking the sides of the hands with the thumbs together several times in the horizontal plane. In using this sign, Anya typically struck the hand with her knuckles together in the vertical plane. Likewise, the sign TELEPHONE is made by placing the thumb on the ear and the little finger at the mouth. But, Anya produced this sign by resting her entire fist against the cheek. Between 17 and 19 months, Anya began to imitate and spontaneously produce more sophisticated signs requiring greater control over movement, placement, and hand formation (e.g., the sign SORRY which requires a counter-clockwise circular movement of a closed right hand against the chest).

An examination of Anya's lexical acquisition as a function of age (Table 1), revealed that she consistently acquired and spontaneously used more signs than spoken words in communicating with other individuals. Between the ages of 7 and 21 months, she produced an average of 43% more signs than spoken words. Possible explanations for the emergence of sign prior to that of spoken words may relate to the earlier development and control of hand muscles or to the notion of iconicity and "basic objects levels" discussed by Rosch, 1977, and Brown, 1977. Rosch claims that there is a "basic" level of conceptual abstraction, at which class members have a maximum number of attributes in common; secondly, class members are the recipients of common motor movements; and thirdly, class members are maximally similar in appearance. This "basic" level of concept formation is also the level at which objects tend first to be named by children (Anglin, 1977). Early signs may more closely resemble or suggest their referents and, therefore, possess a greater potential for the creation of iconicity at the "basic object level" of semantic development. For example, the sign CRY is produced by drawing the index fingers down the cheek. The sign AIRPLANE is made by extending the thumb, index, and little finger of the right hand and moving the hand forward and up—palm facing down—resembling the wings of a plane and the "take-off." These represent signs which Anya acquired early in her linguistic development.

Additionally, it should be noted that Anya's spoken vocabulary complemented her sign vocabulary, with only a small overlap of words that were both spoken and signed. In examining the video-taped sessions over a 14-month period, the results showed that less than 16% of the signifiers consisted of words plus signs. This suggests that the child is not simply learning spoken words to correspond to signs already

Table 1

Lexical Acquisition as a Function of Age

Age (months)	Number of Words	Number of Signs
7	0	1
9	0	3
12	1	5
15	3	8
18	8	15
21	14	24

known or vice versa. It further supports the hypothesis formulated by Stokes and Menyuk (1975), that the child acquiring ASL and spoken language constructs a basic concept of an object or event and encodes it either in one modality or the other but seldom in both. The results of this study also corroborates the findings of the research on the development of two oral languages (German and Italian) in bilingual children (Volterra and Taeschner, 1978). The results of both studies indicate that, at least initially, the child who is in the process of becoming bilingual seems to develop one lexical system with separate entries from both languages.

Anya successfully used signs and spoken words to express various semantic relations. This finding is consistent with the results of previous studies indicating that the full range of semantic relations found in children learning spoken languages is expressed by children acquiring ASL (Ashbrook, 1977; Bellugi and Klima, 1972; Hoffmeister, 1977). In the present study, the criterion for productivity of a semantic relation was the use of five or more different utterances representing a particular structure or semantic relation in the course of five hours or more of observation (Bloom, 1970). The onset of specific semantic functions in Anya's language development was compared with those of the two children, Matthew and Nicky, studied by Greenfield and Smith in 1976. As demonstrated in Table 2, Anya acquired semantic functions at approximately the same age as the two other children, although most of these semantic structures were encoded in sign. The onset of some semantic functions was earlier than that of Nicky or Matthew—for example, Anya expressed the semantic function of the "modification of an event" earlier than the two other children: she produced the sign MORE for "more milk" at the age of 14 months, 6 days, while Matthew demonstrated this semantic function at 18 months, 1 day, and Nicky, at 19 months, 20 days. Another example is that of a type of negation, "nonexistence." At age 17 months, 3 days, Anya produced ALL GONE in sign and speech to express the fact that there was no more milk in her cup. Nicky used "no" at 18 months, 27 days, to express the same concept.

The most important findings of the study concern the relationship of the child's conceptual and linguistic systems. It appears that both ASL and spoken English are adapted to the human central processing system in such a way that lexical items from both languages may be learned simultaneously without interference with the conceptualization of or memory for perceptually significant events or objects. Regardless of whether we describe a child's concepts in terms of functional cores, images, or sets of semantic features, the child's task remains that of developing the conceptions and ultimately acquiring semantics to match. It has been demonstrated that expressing concepts and referring to "reality" can be accomplished with manual signifiers as easily or possibly more readily than with spoken words. This would also lend support to the hypothesis that there exists a single cortical "central organizer" which monitors both oral and manual language systems (Kimura, 1973; Cicone M., Gardner, H., & Zurif, E., 1979).

Table 2

Onset of Semantic Function

Semantic Function	Age (months & days)			Instance (Anya)
	Anya	Matthew	Nicky	* (Capital letters indicate sign)
Performative	7;6	7;22	8;19	MAMA, reaching for mother
Performative Object	8;10	8;12	8;19	MILK, upon seeing cup of milk
Volition	13;20	11;24	11;28	MOMMY, when she could not have gum
Dative	14;5	11;28	18;4	DADA, offering book to father
Modification of Event	14;6	18;1	19;20	MORE, for more milk
Object	14;8	13;0	16;19	ball, after pushing ball
Agent	15;8	13;3	13;3	mommy, hearing mother come in door and start up steps
Object associated with another Object or Location	17;20	14;29	18;8	BATH, upon hearing water filling in bathtub cookie, pointing to kitchen
Action or State of Agent	18;26	13;6	14;21	WASH, when asked, "Do you want to wash your face?"
Action or State of Object	19;3	14;6	18;1	down, after sitting on potty
Location	20;2	15;20	18;19	HAT, while putting hat on teddy bear
Animate Being Associated with Object or Location	22;7	15;29	18;19	doggie, upon seeing a bone

It appears that regardless of whether the child is signing or speaking, the function of language at the earliest stage of development is referential. In addition to the expression of a variety of semantic relations, three main stages in semantic acquisition can be traced in both ASL and spoken English: Stage I—pre-referential thematic mismatches based on the function of objects; Stage II—referential mismatches based upon functional, perceptual, and contextual features (clustered around pre-prototypical functional concepts); and Stage III—perceptually based semantic overextensions which are clearly referential in nature. If, as Brown (1977) has argued, the "basic object level" or real name of a referent is determined by aspects of the physical world (i.e., by characteristics, attributes, and movements), there would seem to be maximal potential for iconicity in signs in early language development. Another way of stating it is that the semantic load of early signs tends to reflect the original iconicity since the object or event is well represented in the sign. Furthermore, Brown states that nouns at the "basic object level" constitute a preponderance of all nouns in the early stages of first language acquisition, and because iconicity appears to facilitate language learning, he claims that at least initially, signed languages are easier to learn than spoken languages.

In conclusion, although the rate of lexical acquisition during the early stages of language development in either ASL or spoken English may be delayed as a result of bilingual learning, the simultaneous acquisition of ASL and spoken English does not appear to retard the child's overall semantic development. On the contrary, more direct access and exposure to language in the visual modality may enhance communicative effectiveness at early stages of development in both deaf and hearing children.

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